

## Large Fluvial Fans: Aspects of the Attribute Array

M. Justin Wilkinson

In arguing for a strict definition of the alluvial fan (coarse-grained with radii  $<10$  km, in mountain-front settings), Blair and McPherson (1994) proposed that there is no meaningful difference between large fluvial fans (LFF) and floodplains, because the building blocks of both are channel-levee-overbank deposits. Sediment bodies at the LFF scale ( $>100$  km long, fan-shaped in planform), are relatively unstudied although  $>160$  are now identified globally. The following perspectives suggest that the significance of LFF needs to be reconsidered.

1—*LFF-formed land surfaces and sediment bodies*: Large areas covered by single (up to  $200,000$  km<sup>2</sup>) and nested LFF ( $0.75$  m km<sup>2</sup> contiguous LFF surfaces in S America) show that such surfaces are significant at continental scales—though often unrecognized, especially when located far from mountain fronts. Since LFF are a major component of modern Distributive Fluvial Systems (DFS—fanlike forms  $>30$  km), their role in the evolution of the buried fluvial strata now holds great interest.

2—*Drainage patterns*: a—Diverging channel patterns over large distances  $>10^2$  km characterize not only coastal deltas, but also LFF situated hundreds of km from coastlines. b—Rivers in marginal depressions between neighboring LFF tend to be the better developed sectors of lowland, non-axial river systems as a result of significantly higher episodic drainage discharge (when two LFF rivers simultaneously flow into the same marginal depression).

3—*LFF cascade*: First-tier LFF (adjacent to an upland) can give rise in large enough basins to a second tier of downstream derived LFF. First-tier LFF show distinct conicality as a prime morphology, whereas derived LFF are flatter or aconical, always displaying alluvial ridges as the most prominent topography.

4—*Stratigraphic record*: The sheer size of LFF surfaces reduces the rate of surface reworking accomplished by the avulsing LFF river. Combined with relatively higher infiltration capacities LFF are likely to hold not only more complete sedimentary records but also more complete pedologic records than those of more frequently reworked floodplain surfaces confined within valley walls.

5—*Applied aspects*: Recognition of a relict LFF in Namibia allowed reinterpretation of the dimensions of two aquifers—as orders of magnitude larger than those implied by the floodplain model. Such reinterpretations can be expected elsewhere. Hydrocarbon exploration can benefit from understanding the architectures and more realistic paleogeographic reconstructions described in 2 and 1 above.

LFF thus warrant classification as a discrete type of fluvial sediment body.